DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE LOGISTICS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE OHIO 45433-5001

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REPLY TO ATTN OF: MMM

SUBJECT: Impact of Implementing of Dyna-METRIC to Compute War Readiness Spares Kit Requirements (WRSK)

TO: HQ USAF/LEXW/LEYS

1. In January 1988, the Air Force approved Dyna-METRIC to Compute War Readiness Spares Kit (WRSK) requirements. In Mar 88, we implemented Dyna-METRIC in the Weapon System Management Information System Requirements Execution Availability Logistics Module (WSMIS/REALM). Dyna-METRIC computes leaner, cheaper requirements than the previous system (D029). The F-15, F-16, and F-111 were the first weapon systems to use the new computation. Our analysis shows Dyna-METRIC reduced generic WRSK requirements for these weapon systems by more than $210 million.

2. Dyna-METRIC was able to reduce requirements from the previous system because Dyna-METRIC considers indenture relationships and maximizes aircraft availability. By considering the indenture structure, Dyna-METRIC accurately models the impact of Shop Replaceable Unit (SRU) availability on the Line Replaceable Units (LRUs). The previous system's algorithm treats all SRUs as LRUs, thereby unnecessarily stocking SRUs when their parent LRUs are available. In addition, Dyna-METRIC uses an aircraft availability function to minimize the cost of achieving fewer grounded aircraft than the Direct Support Objective. The previous system minimized a weighted average of backorders and grounded aircraft, so it did not find the least cost mix of items to meet the aircraft availability goal.

3. Attached is our final report which summarizes the Dyna-METRIC impacts on the F-15, F-16 and F-111 generic WRSK. Our point of contact is Capt Tim Sakulich, HQ AFLC/MMMAA, AUTOVON 787-4139.

FOR THE COMMANDER

MARVIN L. DAVIS, Colonel, USAF
Director, Materiel Requirements
and Financial Management
DCS/Materiel Management

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UNITED STATES AIR FORCE
SEPTEMBER 18, 1947

CONCLUSIONS AND ACTIONS

CONCLUSIONS

1. Dyna-METRIC is better than the previous system, (D029) because it considers indentures and maximizes aircraft availability.

2. In March 1988, the Air Force implemented Dyna-METRIC to compute War Readiness Spares Kits (WRSK). The F-15, F-16, and F-111 were the first weapon systems to use the new computation.

3. Dyna-METRIC reduced generic buy WRSK requirements for F-15, F-16, and F-111 by more than $210 million.

4. Reductions for the F-15 RRR WRSK ranged from $2.2 to $13.8 million per kit.

5. Dyna-METRIC F-15, F-16, and F-111 WRSK contain about 14.8 percent fewer units of stock than the previous system.

6. The Modified Dyna-METRIC model computes WRSK and BLSS that provide the same combat capability with even leaner requirements than (unmodified) Dyna-METRIC.

7. The Weapon System Management Information System (WSMIS) contractor, Dynamics Research Corporation (DRC) is ready to implement the modified Dyna-METRIC model to compute WRSK and BLSS requirements in Requirements Execution Availability Logistics Module (REALM).

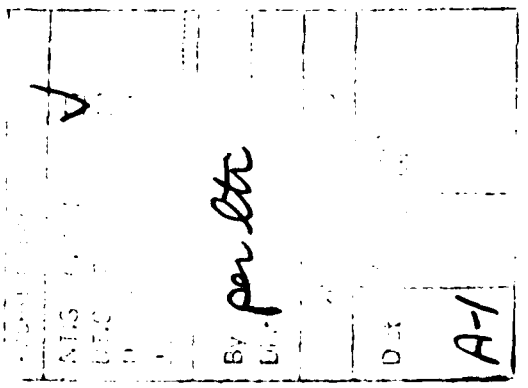
8. Modified Dyna-METRIC also has the capability to maximize aircraft availability with limited funds.

ACTIONS

1. Continue to phase-in Dyna-METRIC for all WRSK and BLSS. (OPR: HQ AFLC/MMM)

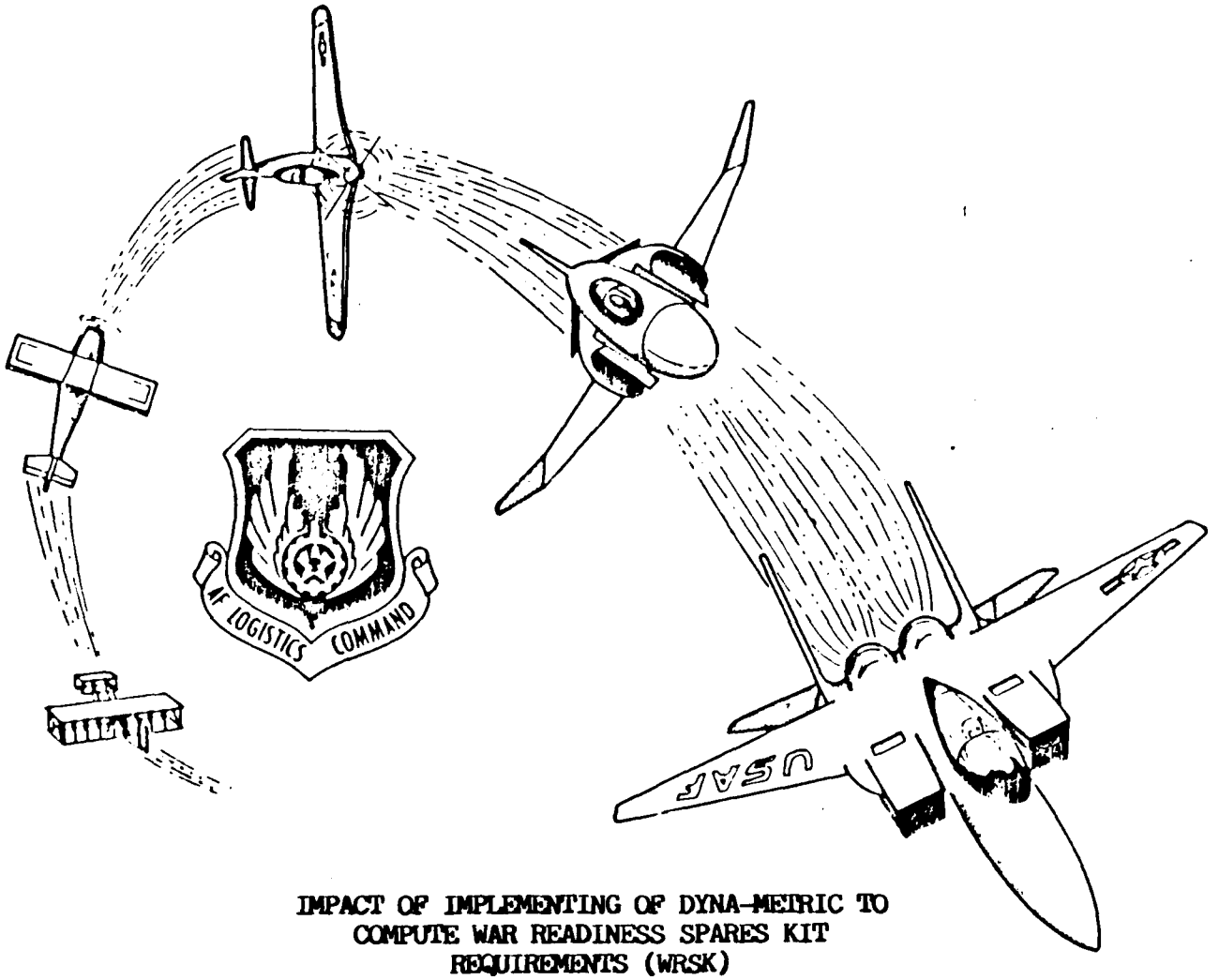
2. Implement the Modified Dyna-METRIC model within WSMIS/REALM to compute full funding WRSK and BLSS requirements. (OPR: HQ AFLC/MMM;
OCR: AFLC LMSC/SMW)

3. Implement the Modified Dyna-METRIC model within WSMIS/REALM to compute limited funding WRSK and BLSS buy quantities (OPR: HQ AFLC/MMM and AFLC LMSC/SMW)



AIR FORCE LOGISTICS COMMAND

MATERIEL ANALYSIS



IMPACT OF IMPLEMENTING OF DYNA-METRIC TO COMPUTE WAR READINESS SPARES KIT REQUIREMENTS (WRSK)

Capt Tim Sakulich, MMMAA
Lt Col Doug Blazer
1Lt Lisa Oster, MMMAA
Larry Collins, MMMAA

December 1988

FINAL REPORT

TITLE: Impact of Implementing Dyna-METRIC to Compute War Readiness Spares Kits (WRSK) Requirements

PROJECT MANAGER: Capt Tim Sakulich, Chief, Materiel Analysis Branch, DCS/Materiel Management, AUTOVON 787-4139

TEAM MEMBERS: 1Lt Lisa Oster, HQ AFLC/MMMAA, AUTOVON 787-5269
Larry Collins, HQ AFLC/MMMAA, AUTOVON 787-5314

BACKGROUND: In our 1987 report, "Using Dyna-METRIC to Compute War Readiness Spares Kit (WRSK) Requirements," [1] we described the advantages of Dyna-METRIC over the previous system (D029). We also predicted significant reductions in WRSK requirements costs by implementing the Dyna-METRIC computation. In January 1988, the Air Force approved using Dyna-METRIC to compute WRSK. In March 1988, we implemented Dyna-METRIC in the Weapon System Management Information System Requirements/Execution Availability Logistics Module (WSMIS/REALM). The F-15, F-16 and F-111 were the first weapon systems to use the new computation.

PROBLEM: We need to determine the actual WRSK requirements reductions for the F-15, F-16, and F-111 due to Dyna-METRIC.

ANALYSIS

We first reiterate some of the advantages of Dyna-METRIC and then discuss the implementation results.

Advantages of Dyna-METRIC

In our 1987 report, we described how Dyna-METRIC computes leaner, cheaper requirements than the previous system. This is because Dyna-METRIC accurately considers indenture relationships and maximizes aircraft availability. By considering the indenture structure, Dyna-METRIC accurately models the impact of Shop Replaceable Unit (SRU) availability on the Line Replaceable Units (LRUs). The previous system's algorithm treated all SRUs as LRUs, thereby unnecessarily stocking SRUs when their parent LRUs are available. In addition, Dyna-METRIC uses an aircraft availability function to minimize the cost of achieving fewer grounded aircraft than the Direct Support objective. The previous system minimized a weighted average of backorders and grounded aircraft, so it did not find the least cost mix of items to meet the aircraft availability goal.

Implementation Results

We extracted 1988 data from the production system database for the F-15, F-16 and F-111 generic buy WRSK. These kits represent the generic buy requirements for kits to be fielded in FY90. The kits are not the actual buy quantities, however. The generic kits do not consider available assets or average weapon system application percents which must be factored in by the Recoverable Consumption Item Requirements System (D041) to determine actual buys. Nevertheless, these kits show the relative impact of implementing Dyna-METRIC.

We obtained the data after all the March 1988 production system computations were completed. In other words, this data represented the negotiated and approved rates and factors for the kits. We then compared computations of the WRSK requirements using the previous computation (D029) and Dyna-METRIC. Table 1 shows Dyna-METRIC reduced generic requirements costs for these weapon systems by more than $210 million.

COMPARISON OF WRSK COST

Weapon System	Number of Authorized Buy Kits	D029 Computed Cost	Dyna-METRIC Computed Cost	Reduction In Rqmts Cost
F-15	23	$1,163M	$1,000M	$163M
F-16	32	$1,187M	$1,146M	$ 41M
F-111	6	$ 465M	$ 458M	$ 7M
Total	61	$2,815M	$2,604M	$211M

Table 1

In our 1987 report, we predicted the largest requirements reductions would be for remove/repair/replace (RRR) WRSK. Unlike the previous system, Dyna-METRIC accurately represents the tradeoff between stocking SRUs and LRUs and this is particularity important in RRR kits. Our 1987 report predicted generic requirements reductions between $7 and $15 million per RRR WRSK. The actual reductions for the F-15 RRR WRSK ranged from $2.2 to $13.8 million per generic kit with an average $7 million reduction. For the remove/replace (RR) F-16 and F-111 WRSK, the reductions were less, averaging only about $1.2 million per generic kit.

To determine the impacts on the content of the WRSK we compared the number of units in the kits. Table 2 shows the results.

COMPARISON OF WRSK DEPTH

Weapon System	Authorized Buy Kits	Current System (D029)	Number of Units Dyna-METRIC	Total Reduction	Percent Reduction Per Kit
F-15	23	49,384	43,203	6,171	12.5%
F-16	32	85,458	71,538	13,920	16.3%
F-111	6	12,947	11,098	1,849	14.3%
Total	61	147,779	125,839	21,940	14.8%

Table 2

As expected, Dyna-METRIC significantly reduced the size of the WRSK for these weapon systems. In fact, Dyna-METRIC kits contain about 14.8 percent fewer units of stock on average than the previous (D029) system kits.

Phase-In Schedule

Current plans are to phase-in the Dyna-METRIC computation for other weapon system WRSK. The phase-in schedule corresponds to the Air Force War Reserve Materiel (WRM) review cycle schedule shown in Table 3. In [2] we showed how the Air Force could use Dyna-METRIC to compute Base Level Self-Sufficiency Spares (BLSS) requirements. This was approved by the Air Force in April 1988, and we begin computing Dyna-METRIC BLSS in May 1988. Like WRSK, we plan to phase in the computation of BLSS according to the WRM review schedule.

WRM Review Schedule and
Implementation of Dyna-METRIC Requirements

Weapon System	Implementation of Dyna-METRIC WRSK	BLSS
F-15	Mar 88	Sep 88
F-16	Mar 88	Oct/Nov 88
F-111	Mar 88	Oct 88
C-130	May 88	May 89
OA-37B	May 88	May 89
C-140	May 88	May 89
T-39	Jul 88	Jul 88
F-4	Sep 88	Sep 88
C-135	Aug 88	Aug 88
E-3	Aug 88	Aug 88
OV-10A	Oct 88	Oct 88
Helicopters	Oct 88	Oct 88
A-7	Nov 88	Nov 88
B-52	Dec 88	Dec 88
A-10	Feb 89	Feb 89

Table 3

Future Enhancements

We've show how the current Dyna-METRIC implementation accurately considers indentures and significantly reduces WRSK requirements when compared to the previous system. The current version of the model does not fully optimize between stocking SRUs and LRUs. In fact, the current version actually considers three different ways to stock SRUs for each WRSK computation. It looks at stocking SRUs to 80, 85 and 90 percent availability, across the board, then optimizes the LRUs to achieve the target aircraft availability goal for each SRU stockage level. The system then selects the least cost kit from these three options.

In [3] we showed how a modified version of Dyna-METRIC is able to fully optimize the LRU-SRU tradeoff to compute requirements. The Modified Dyna-METRIC model computes WRSK and BLSS that provide the same combat capability with even leaner requirements than (unmodified) Dyna-METRIC. In addition to computing requirements, Modified Dyna-METRIC has the capability to compute the spares needed to maximize aircraft availability with limited funds. We showed how this Modified Dyna-METRIC could reduce generic requirements by another $76 to $346 million per RRR WRSK and BLSS.

The new modified model is still Dyna-METRIC; the resulting kits still provide an 80 percent probability of having fewer than six (out of 24) aircraft grounded. The WSMIS contractor, Dynamics Research Corporation (DRC), is ready to implement the Modified Dyna-METRIC model to compute WRSK and BLSS requirements in REALM. We have adequately tested the model in WSMIS/REALM and we intend to begin using it to compute requirements when the REALM on-line computation data base is completed in May 1989.

DRC has also validated using Modified Dyna-METRIC to compute limited funding WRSK and BLSS buy quantities (i.e., maximize aircraft availability within a funding cap) for budget execution. We expect to implement REALM budget execution in October 1989.

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REFERENCES

1. Blazer, Douglas J., Lt Col., and Professor Doug Rippy, "Using Dyna-METRIC to Compute War Readiness Spares Kit (WRSK) Requirements," AFLC Materiel Analysis Technical Report, August 1987.

2. Blazer, Douglas J., Lt Col., Captain Timothy J. Sakulich, and Professor Doug Rippy, "Using Dyna-METRIC to Compute Base Level Self-Sufficiency Spares (BLSS) Requirements," AFLC Materiel analysis Technical Report, May 1988.

3. Blazer, Douglas J., Lt Col, and Professor Doug Rippy, "Modified Dyna-METRIC: Funding the Least Cost Mix of Wartime Spares," AFLC Materiel Analysis Technical Report, April 1988.